

1. Work requester fills out this section.

☐ Standing Work Permit

Requester: Don Lynch	Date: 06/07/2010	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Jim LaBounty			Ext.: 7774
Work Control Coordinator: Don Lynch		Start Date: 06/21/2010	Est. End Date: 12/1/2010
Brief Description of Work: MPC Installation and Removal in support of New Beampipe Installation			
Building: 1008	Room: IR	Equipment: MPC N & S	Service Provider: PHENIX techs

WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis

ES&H ANALYSIS						
Radiation Concerns		<input checked="" type="checkbox"/> None	<input type="checkbox"/> Activation	<input type="checkbox"/> Airborne	<input type="checkbox"/> Contamination	<input checked="" type="checkbox"/> Radiation
Radiation Generating Devices:		<input type="checkbox"/> Radiography	<input type="checkbox"/> Moisture Density Gauges	<input type="checkbox"/> Soil Density Gauges	<input type="checkbox"/> X-ray Equipment	
<input type="checkbox"/> Special nuclear materials involved, notify Isotope Special Materials Group			<input type="checkbox"/> Fissionable materials involved, notify Laboratory Criticality Officer			
Safety Concerns		<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> Ergonomics	<input type="checkbox"/> Transport of Haz/Rad Material		
<input type="checkbox"/> Adding/Removing Walls or Roofs	<input checked="" type="checkbox"/> Confined Space*	<input type="checkbox"/> Explosives	<input type="checkbox"/> Lead*	<input type="checkbox"/> Penetrating Fire Walls		
	<input type="checkbox"/> Corrosive	<input type="checkbox"/> Flammable	<input type="checkbox"/> Magnetic Field*	<input type="checkbox"/> Pressurized Systems		
<input type="checkbox"/> Asbestos*	<input type="checkbox"/> Cryogenic	<input type="checkbox"/> Fumes/Mist/Dust*	<input checked="" type="checkbox"/> Material Handling	<input type="checkbox"/> Rigging/Critical Lift		
<input type="checkbox"/> Beryllium*	<input type="checkbox"/> Electrical	<input type="checkbox"/> Heat/Cold Stress	<input type="checkbox"/> Noise*	<input type="checkbox"/> Toxic Materials*		
<input type="checkbox"/> Biohazard*	<input checked="" type="checkbox"/> Elevated Work*	<input type="checkbox"/> Hydraulic	<input type="checkbox"/> Non-ionizing Radiation*	<input type="checkbox"/> Vacuum		
<input type="checkbox"/> Chemicals*	<input type="checkbox"/> Excavation	<input type="checkbox"/> Lasers*	<input type="checkbox"/> Oxygen Deficiency*	<input type="checkbox"/> Other		
* Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No						
Environmental Concerns		<input checked="" type="checkbox"/> None	<input type="checkbox"/> Work impacts Environmental Permit No.			
<input type="checkbox"/> Atmospheric Discharges (rad/non-rad)	<input type="checkbox"/> Land Use	<input type="checkbox"/> Soil Activation/contamination	<input type="checkbox"/> Waste-Mixed			
<input type="checkbox"/> Chemical or Rad Material Storage or Use	<input type="checkbox"/> Liquid Discharges	<input type="checkbox"/> Waste-Clean	<input type="checkbox"/> Waste-Radioactive			
<input type="checkbox"/> Cesspools (UIC)	<input type="checkbox"/> Oil/PCB Management	<input type="checkbox"/> Waste-Hazardous	<input type="checkbox"/> Waste-Regulated Medical			
<input type="checkbox"/> High water/power consumption	<input type="checkbox"/> Spill potential	<input type="checkbox"/> Waste-Industrial	<input type="checkbox"/> Underground Duct/Piping			
Waste disposition by:		<input type="checkbox"/> Other				
Pollution Prevention (P2)/Waste Minimization Opportunity:		<input checked="" type="checkbox"/> None <input type="checkbox"/> Yes				
FACILITY CONCERNS		<input checked="" type="checkbox"/> None				
<input type="checkbox"/> Access/Egress Limitations	<input type="checkbox"/> Electrical Noise	<input type="checkbox"/> Potential to Cause a False Alarm			<input type="checkbox"/> Vibrations	
	<input type="checkbox"/> Impacts Facility Use Agreement			<input type="checkbox"/> Temperature Change		
<input type="checkbox"/> Configuration Control	<input type="checkbox"/> Maintenance Work on Ventilation Systems			<input type="checkbox"/> Utility Interruptions		
WORK CONTROLS						
Work Practices						
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Exhaust Ventilation	<input checked="" type="checkbox"/> Lockout/Tagout	<input type="checkbox"/> Spill Containment	<input type="checkbox"/> Security (see Instruction Sheet)		
<input checked="" type="checkbox"/> Back-up Person/Watch	<input type="checkbox"/> HP Coverage	<input type="checkbox"/> Posting/Warning Signs	<input type="checkbox"/> Time Limitation	<input type="checkbox"/> Other		
<input type="checkbox"/> Barricades	<input type="checkbox"/> IH Survey	<input type="checkbox"/> Scaffolding-requires inspection	<input type="checkbox"/> Warning Alarm (i.e. "high level")			
Protective Equipment						
<input type="checkbox"/> None	<input type="checkbox"/> Ear Plugs	<input type="checkbox"/> Gloves	<input type="checkbox"/> Lab Coat	<input checked="" type="checkbox"/> Safety Glasses		
<input type="checkbox"/> Coveralls	<input type="checkbox"/> Ear Muffs	<input type="checkbox"/> Goggles	<input type="checkbox"/> Respirator	<input checked="" type="checkbox"/> Safety Harness		
<input type="checkbox"/> Disposable Clothing	<input type="checkbox"/> Face Shield	<input checked="" type="checkbox"/> Hard Hat	<input type="checkbox"/> Shoe Covers	<input checked="" type="checkbox"/> Safety Shoes	<input type="checkbox"/> Other	
Permits Required (Permits must be valid when job is scheduled.)						
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Cutting/Welding	<input type="checkbox"/> Impair Fire Protection Systems				
<input type="checkbox"/> Concrete/Masonry Penetration	<input type="checkbox"/> Digging/Core Drilling	<input type="checkbox"/> Rad Work Permit-RWP No				
<input type="checkbox"/> Confined Space Entry	<input type="checkbox"/> Electrical Working Hot	<input type="checkbox"/> Other				
Dosimetry/Monitoring						
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Heat Stress Monitor	<input type="checkbox"/> Real Time Monitor	<input checked="" type="checkbox"/> TLD			
<input type="checkbox"/> Air Effluent	<input type="checkbox"/> Noise Survey/Dosimeter	<input type="checkbox"/> Self-reading Pencil Dosimeter	<input type="checkbox"/> Waste Characterization			
<input type="checkbox"/> Ground Water	<input type="checkbox"/> O ₂ /Combustible Gas	<input type="checkbox"/> Self-reading Digital Dosimeter	<input type="checkbox"/> Other Check O ₂ level prior to entry			
<input type="checkbox"/> Liquid Effluent	<input type="checkbox"/> Passive Vapor Monitor	<input type="checkbox"/> Sorbent Tube/Filter Pump				
Training Requirements (List below specific training requirements)						
CA -Collider User, PHENIX Awareness, Working at heights						
Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:			If using the permit when all hazard ratings are low, only the following need to sign: (Although allowed, there is no need to use back of form)			
ES&H Risk Level:	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	WCC:	Date:	
Complexity Level:	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	Service Provider:	Date:	
Work Coordination:	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	Authorization to start	Date:	
(Departmental Sup/WCC/Designee)						

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, and personnel availability need to be addressed): During the 2010 Shutdown, PHENIX will be installing a new beampipe. In order to install the beampipe, it is required that the MPC north and south detectors be removed and reinstalled. This set of tasks has been performed successfully several times during previous PHENIX Shutdown periods. The specific procedure details are contained the work plan attached to this permit.				
Special Working Conditions Required: None				
Operational Limits Imposed: Modification work limited to lower octants easily reachable when standing on lower magnet superstructure.				
Post Work Testing Required: No				
Job Safety Analysis Required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Walkdown Required: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Reviewed by: Primary Reviewer will determine the size of the review team and the other signatures required based on hazards and job complexity. Primary Reviewer signature means that the hazards and risks that could impact ES&H have been identified and will be controlled according to BNL requirements.				
Title	Name (print)	Signature	Life #	Date
Primary Reviewer				
ES&H Professional				
Other				
Other				
Work Control Coordinator				
Service Provider				
Review Done: <input type="checkbox"/> in series		<input type="checkbox"/> team		

4. Job site personnel fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).			
Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:
Workers are encouraged to provide feedback on ES&H concerns or on ideas for improved job work flow. Use feedback form or space below.			

5. Departmental Job Supervisor, Work Control Coordinator/Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)			
Name:	Signature:	Life#:	Date:

6. Departmental Job Supervisor, Work Requester/Designee determines if Post Job Review is required. ☐ Yes ☐ No

Post Job Review (Fill in names of reviewers)			
Name:	Signature:	Life#:	Date:
Name:	Signature:	Life#:	Date:

7. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)	
a) WCM/WCC: Is any feedback required? <input type="checkbox"/> Yes <input type="checkbox"/> No	
b) Workers: Are there better methods or safer ways to perform this job in the future? <input type="checkbox"/> Yes <input type="checkbox"/> No	

8. Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor)

Name:	Signature:	Life#:	Date:
Comments:			

**MPC South and North Detector Subsystems, Removal and Reinstallation
PHENIX IR, Bldg. 1008**

Discussion

A new beampipe is to be installed in the PHENIX experiment during the maintenance and upgrade shutdown of the summer of 2010. This effort requires that all sections of the PHENIX beampipe between the north and south gate (isolation) valves be removed and replaced with either new sections or (in the case of the 2 bellows) be removed and reinstalled with the new beam pipe. All sections of the beampipe will then be baked at 250°F. In order to prevent damage to the MPC detectors during any of these tasks, both MPC detector subsystems (north and south) shall be removed prior to removal of the existing beampipe and reinstalled after bakeout of the entire new beampipe.

Note: Prior to commencing the removal of the MPC subsystems, a suitable temporary staging area shall be setup in the PHENIX electronics tech shop to store the MPC modules after they are removed from the IR until such time as the new beampipe has been installed and baked out.

Caution: During all phases of the work described herein, maintain extreme care at all times to prevent contact with the beam pipe.

Procedures

A. Removal of South MPC

1. LOTO the power to the MMS magnet coil (if not already locked out) at the power supply in 1008B.
2. Assure that the CM is locked in its northern most position by locking out the hydraulics to each magnet mover.
3. Assure that all power to the detector is locked out

Note: Only PHENIX technicians fully trained and approved for this operation by the cognizant engineers and technical supervisor may operate the articulated arm man lift. A maximum of 2 people may perform the following work in the manlift bucket and a third person shall be in the PHENIX IR, aware of the work being performed, and within communication distance at all times. The passenger in the manlift shall be fully trained as indicated above and shall be approved for this work by the cognizant engineers and technical supervisor.

4. Using the articulated arm manlift, carefully driven to avoid any possibility of contact with adjacent detector components or the beampipe to access the MMS piston cavity, carefully detach the signal and power cables, move the detached cables away from the piston hole and secure them so that they will not interfere with beampipe installation or be exposed to damage during beampipe installation operations.
5. Disassemble the individual octants in reverse order indicated in the attached MPC South Installation Plan. (Note: individual modules within the octants may be removed first or may be removed intact in the octants at the discretion of the MPC engineer/scientist/technician overseeing the operation.)
6. As octants are removed, transport them to the MPC temporary staging area in the PHENIX electronics assembly room.

B. Removal of North MPC

1. LOTO the power to the MMN magnet coil at the power supply in 1008B.
2. Assure that the CM is locked in its southern most position by locking out the hydraulics to each magnet mover.
3. Assure that all power to the detector is locked out.

Note: Only PHENIX technicians fully trained and approved for this operation by the cognizant engineers and technical supervisor may operate the articulated arm man lift. A maximum of 2 people may perform the following work in the manlift bucket and a third person shall be in the PHENIX IR, aware of the work being performed, and within communication distance at all times. The passenger in the manlift shall be fully trained as indicated above and shall be approved for this work by the cognizant engineers and technical supervisor.

4. Using the articulated arm manlift, carefully driven to avoid any possibility of contact with adjacent detector components or the beampipe to access the MMS piston cavity, carefully detach the signal and power cables, move the detached cables away from the piston hole and secure them so that they will not interfere with beampipe installation or be exposed to damage during beampipe installation operations.
5. Remove the electronics cards and front panels from each of the sextants,
6. Remove the individual modules from each sextant and carefully stow them for reassembly.

7. Disassemble the individual sextants in reverse order indicated in the attached MPC North Installation Plan.
8. As sextants are removed, transport them to the MPC temporary staging area in the PHENIX electronics assembly room and reassemble the individual modules into the sextants to store until ready for reinstallation in the piston hole.

C. Reinstallation of South MPC

1. After beampipe installation and bakeout have been completed, LOTO the power to the MMS magnet coil (if not already locked out) at the power supply in 1008B.
2. Assure that the CM is locked in its northern most position by locking out the hydraulics to each magnet mover.
3. Assure that all power to the detector is locked out

Note: Only PHENIX technicians fully trained and approved for this operation by the cognizant engineers and technical supervisor may operate the articulated arm man lift. A maximum of 2 people may perform the following work in the manlift bucket and a third person shall be in the PHENIX IR, aware of the work being performed, and within communication distance at all times. The passenger in the manlift shall be fully trained as indicated above and shall be approved for this work by the cognizant engineers and technical supervisor.

4. Retrieve the 8 octant sections of the MPC South from the temporary staging area in the PHENIX electronics assembly room.
5. Using the articulated arm manlift, carefully driven to avoid any possibility of contact with adjacent detector components or the beampipe to access the MMS piston cavity, carefully install the 8 octants. (Note: individual octants may be installed intact with all individual modules pre-installed or as empty octants and the individual modules and front covers installed after all 8 empty octants have been installed at the discretion of the MPC engineer/scientist/technician overseeing the operation. (See the MPC South Installation Plan, attached.) Refer to the MPC North Installation Plan, attached, for details.)
6. Connect front end electronics, power and signal cables, etc.
7. Align and position the MPC as desired.
8. Test, commission and verify operation of all MPC South components.

D. Reinstallation of North MPC

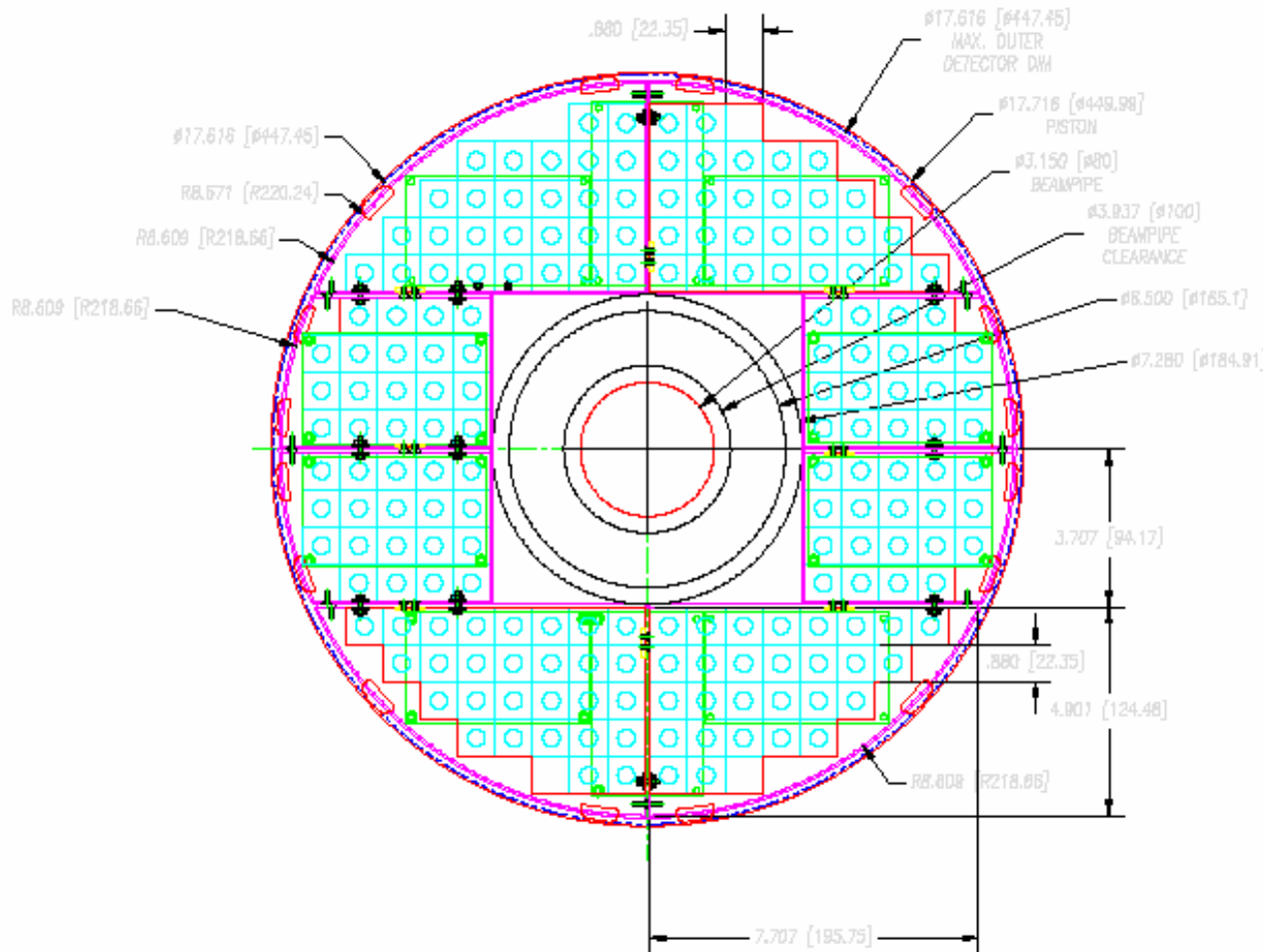
1. After beampipe installation and bakeout have been completed, LOTO the power to the MMN magnet coil (if not already locked out) at the power supply in 1008B.
2. Assure that the CM is locked in its southern most position by locking out the hydraulics to each magnet mover.
3. Assure that all power to the detector is locked out

Note: Only PHENIX technicians fully trained and approved for this operation by the cognizant engineers and technical supervisor may operate the articulated arm man lift. A maximum of 2 people may perform the following work in the manlift bucket and a third person shall be in the PHENIX IR, aware of the work being performed, and within communication distance at all times. The passenger in the manlift shall be fully trained as indicated above and shall be approved for this work by the cognizant engineers and technical supervisor.

4. Retrieve the 6 sextant sections of the MPC North from the temporary staging area in the PHENIX electronics assembly room.
5. Using the articulated arm manlift, carefully driven to avoid any possibility of contact with adjacent detector components or the beampipe to access the MMS piston cavity, carefully install the 6 sextants. The north sextants are installed and aligned empty, after which the individual modules are assembled and cabled. Front covers are then attached.
6. Connect front end electronics, power and signal cables, etc.
7. Align and position the MPC as desired.
8. Test, commission and verify operation of all MPC North components.

MPC South Installation Plan

MPC Installation

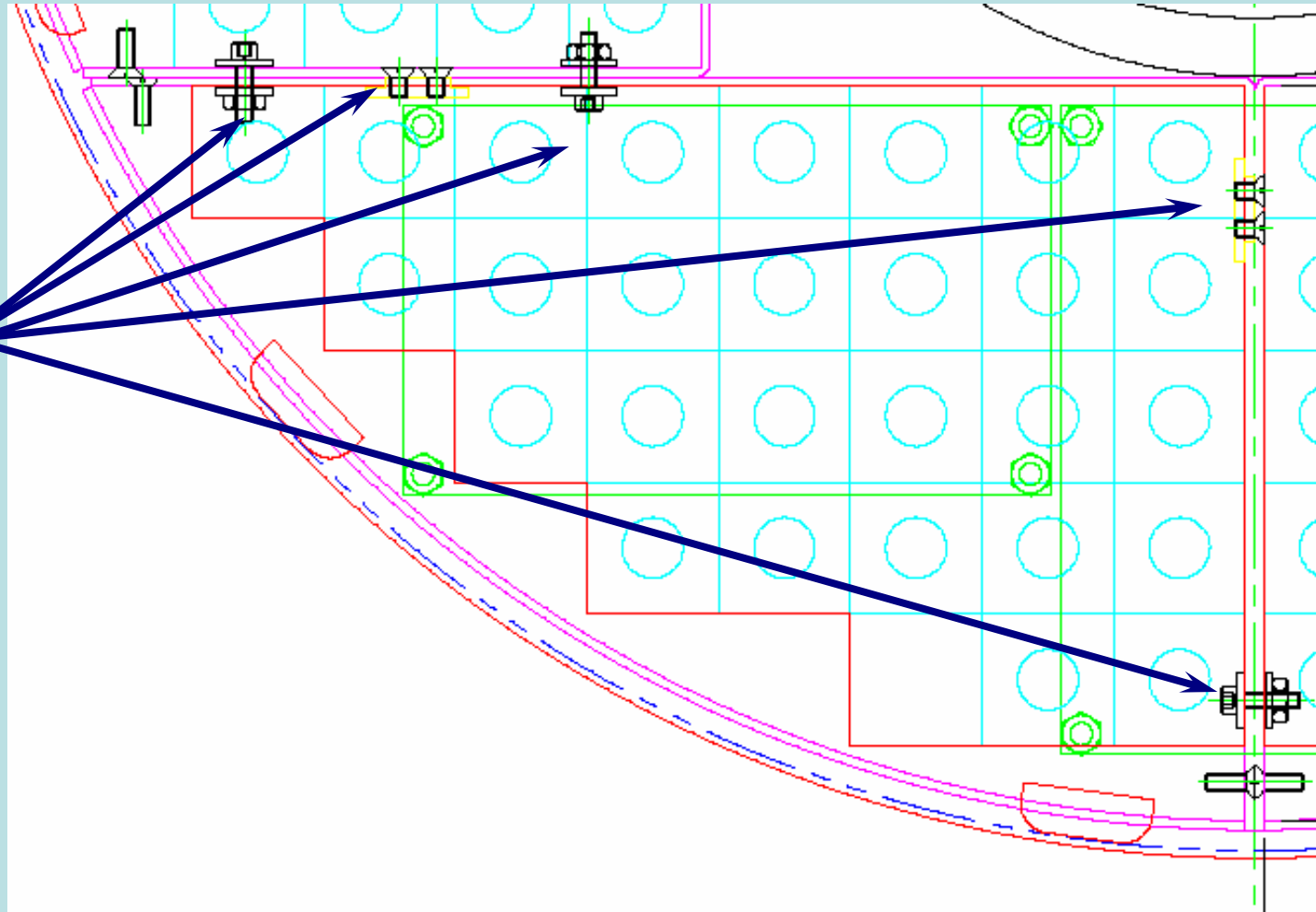


8 modules:

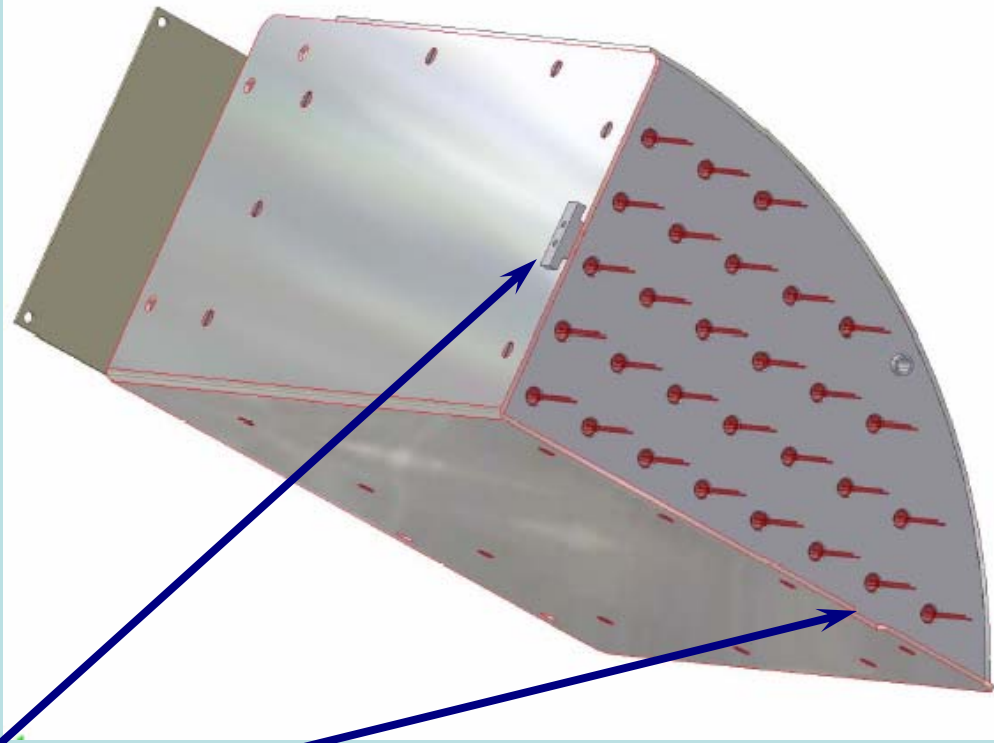
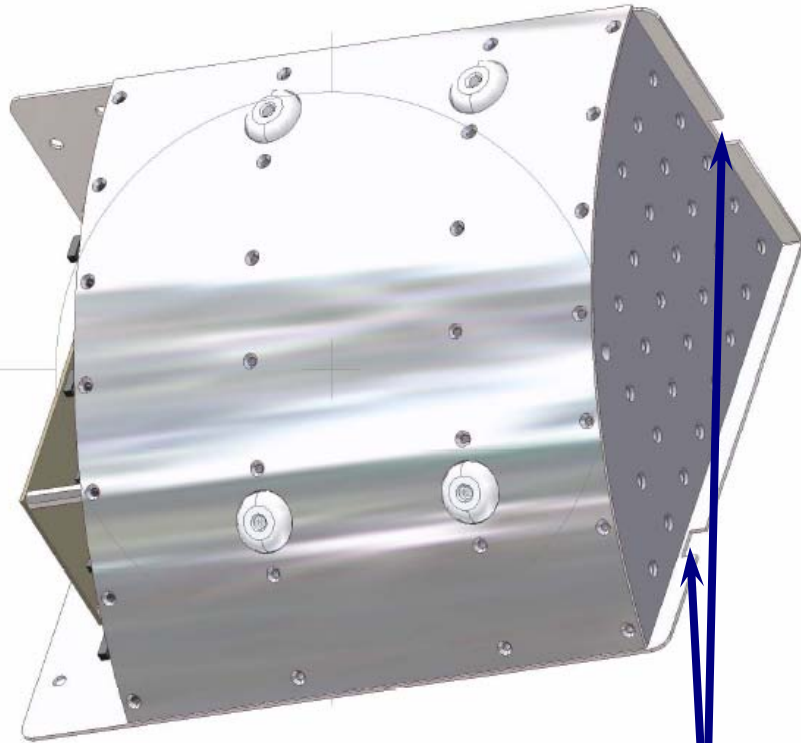
- 4 wedges w/ 29 crystals each
- 4 bricks w/18 crystals each
- 188 crystals total

MPC Installation

Modules are attached to adjacent modules with tab/slots at rear and screws at front

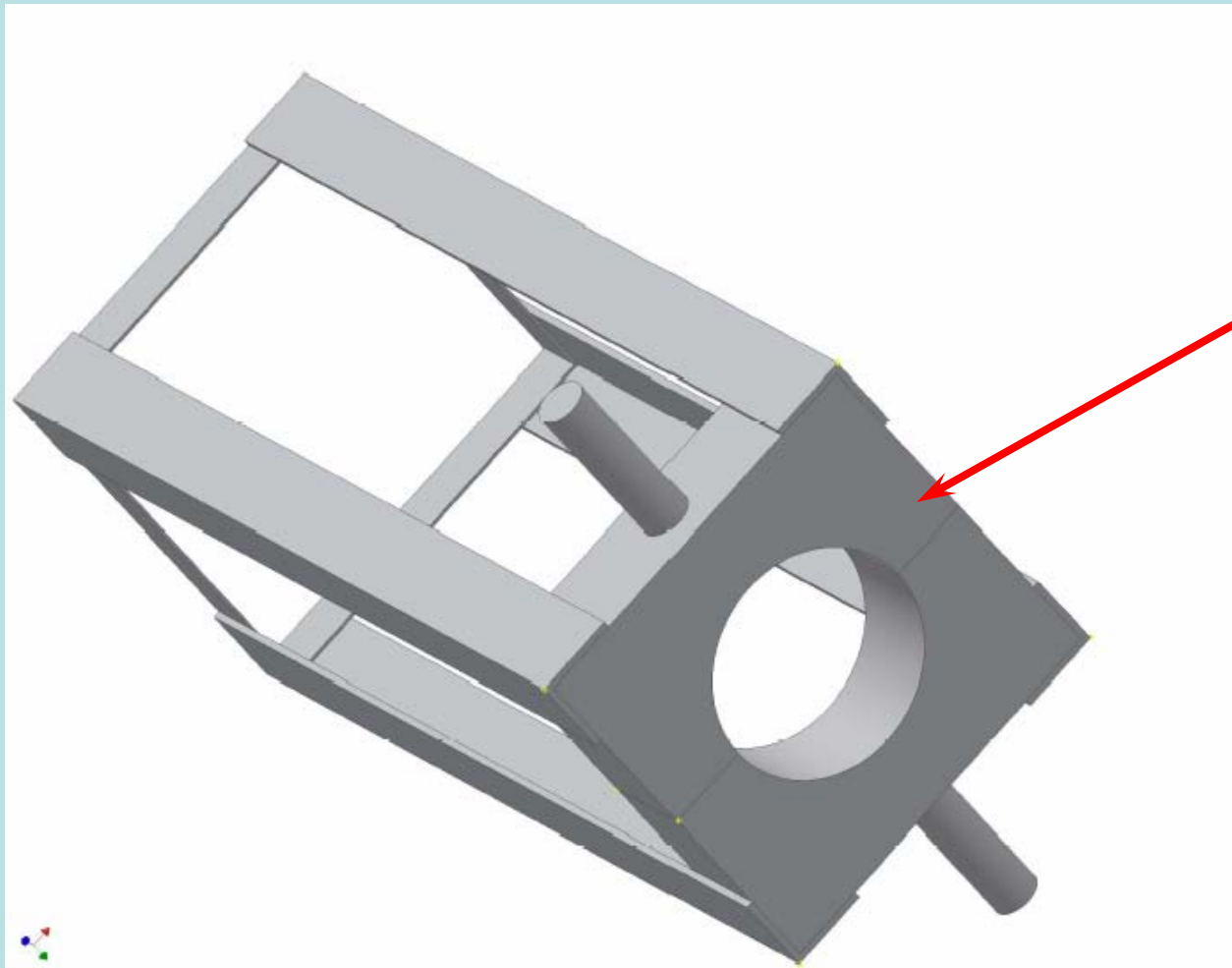


MPC Installation



Locking Tabs at rear of modules

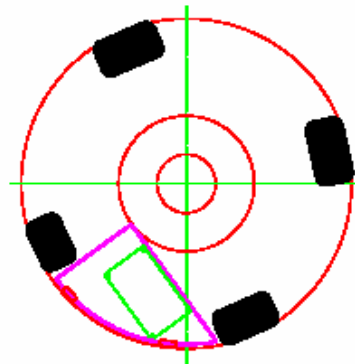
MPC Installation



**MPC Installation
Tool**

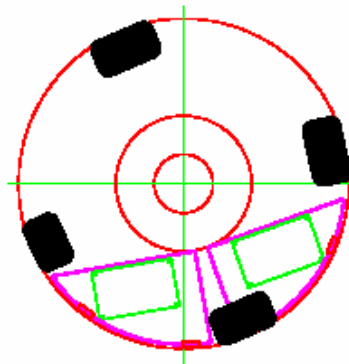
MPC Installation

1. Insert lower-west wedge module



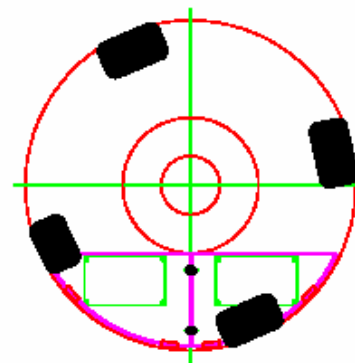
STEP 1

2. Rotate lower-west wedge module counter-clockwise, insert lower-east module



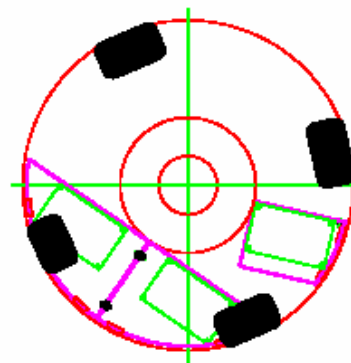
STEP 2

3. Rotate lower wedge modules to normal position



STEP 3

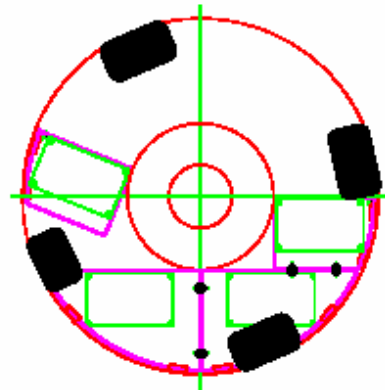
4. Rotate lower wedge modules clockwise, insert below-center west block module



STEP 4

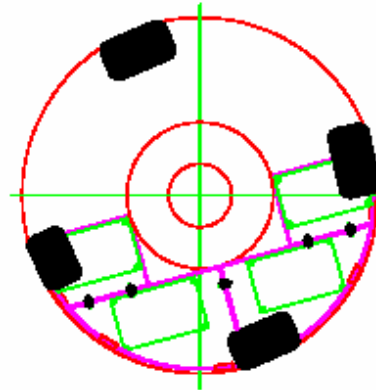
MPC Installation

5. Rotate modules back to normal position. Insert below-center east block module



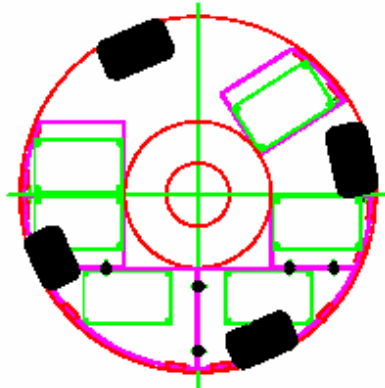
STEP 5

6. Rotate modules counter-clockwise, insert above-center east block module



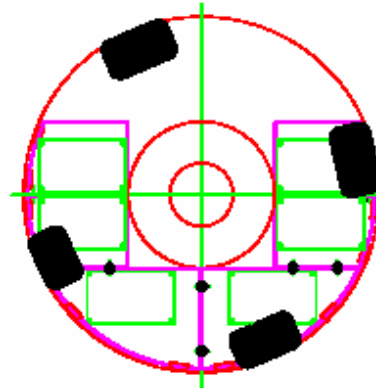
STEP 6

7. Rotate modules to normal position. Insert above-center West block module



STEP 7

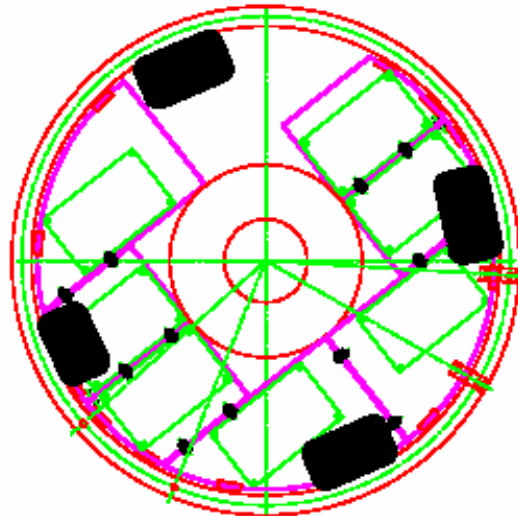
8. Ready for upper wedge modules



STEP 8

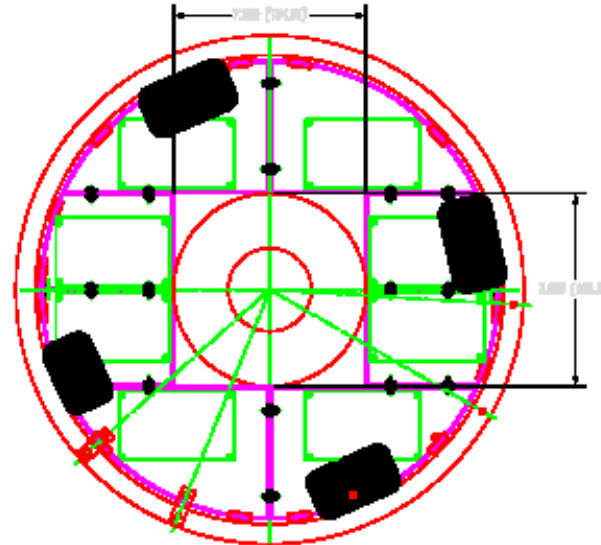
MPC Installation

9. Rotate modules counter-clockwise. Insert upper east wedge



STEP 9

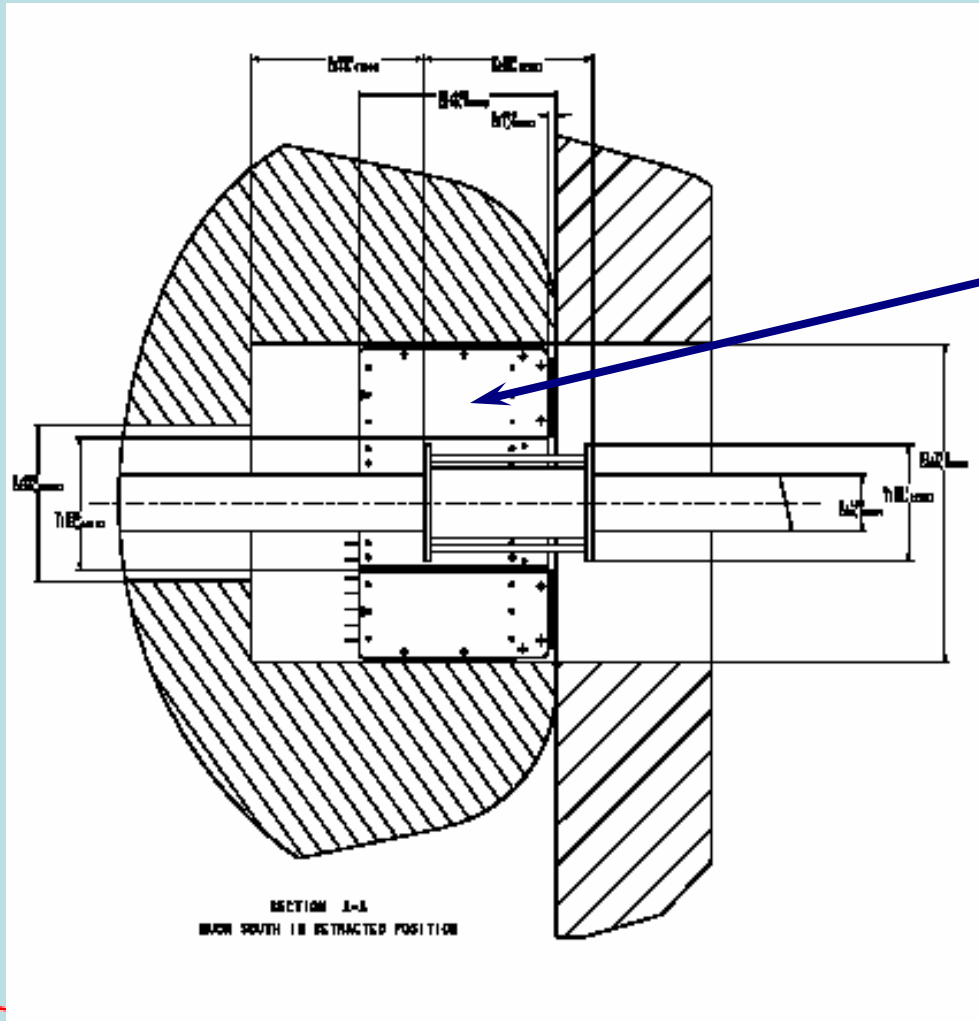
10. Rotate modules clockwise, to normal position. Insert upper-west wedge module



STEP 10

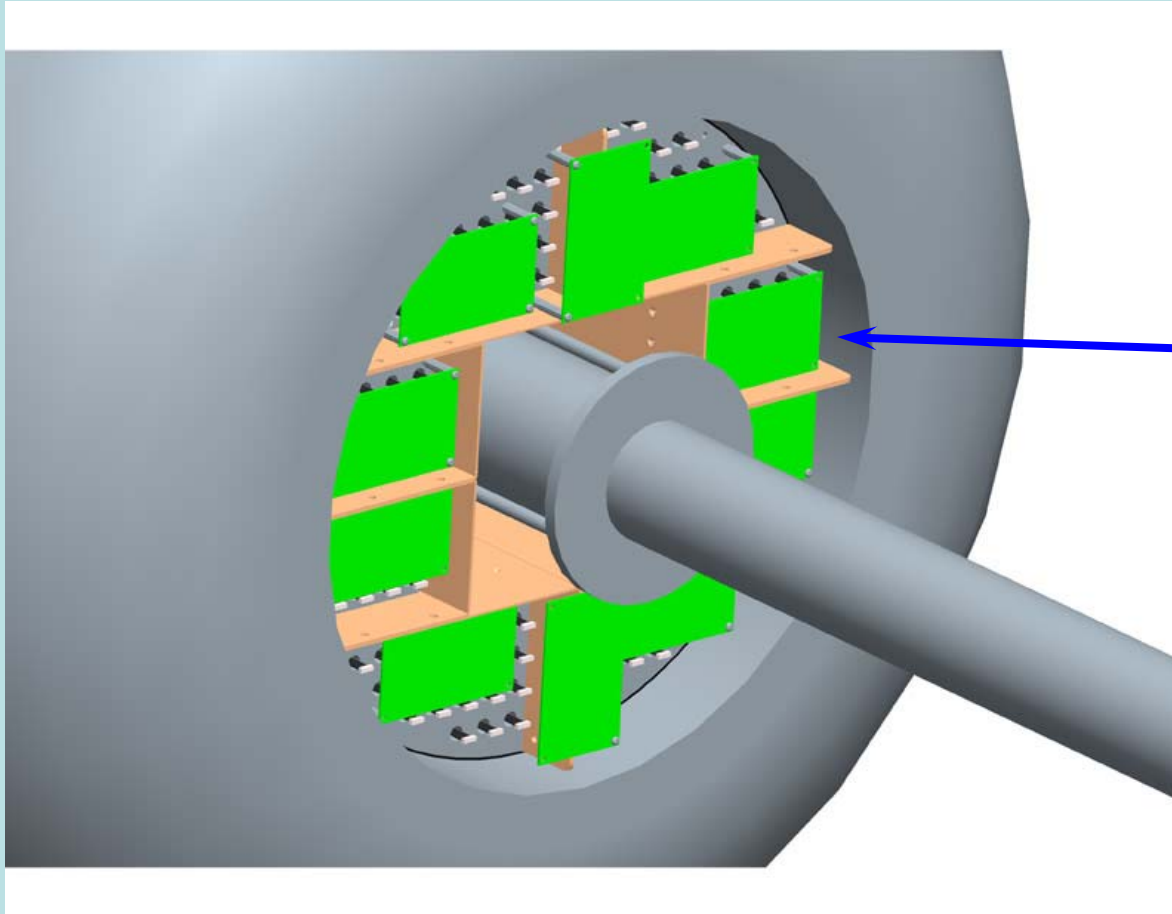
11. Connect cables and gas lines, push assembly to back wall of cavity align and lock in position

MPC Installation



MPC after all modules are installed, before moving back in cavity and before being cabled

MPC Installation

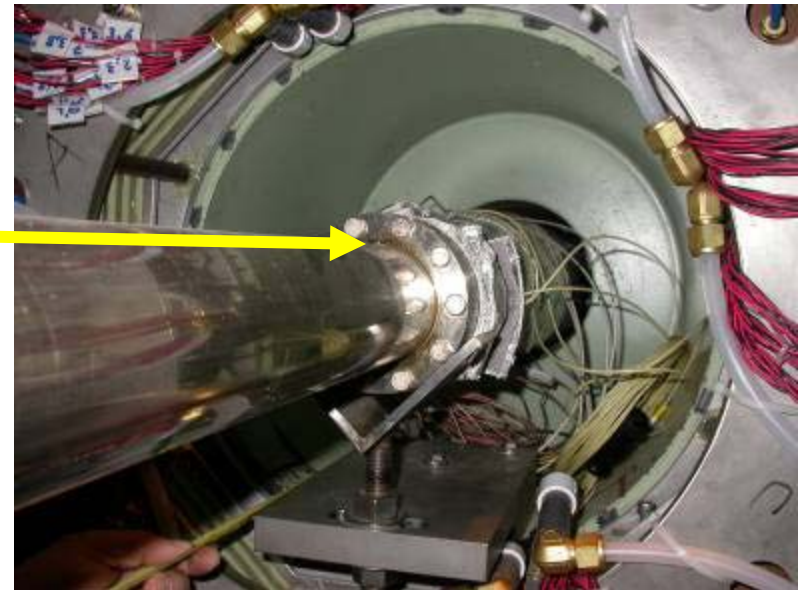
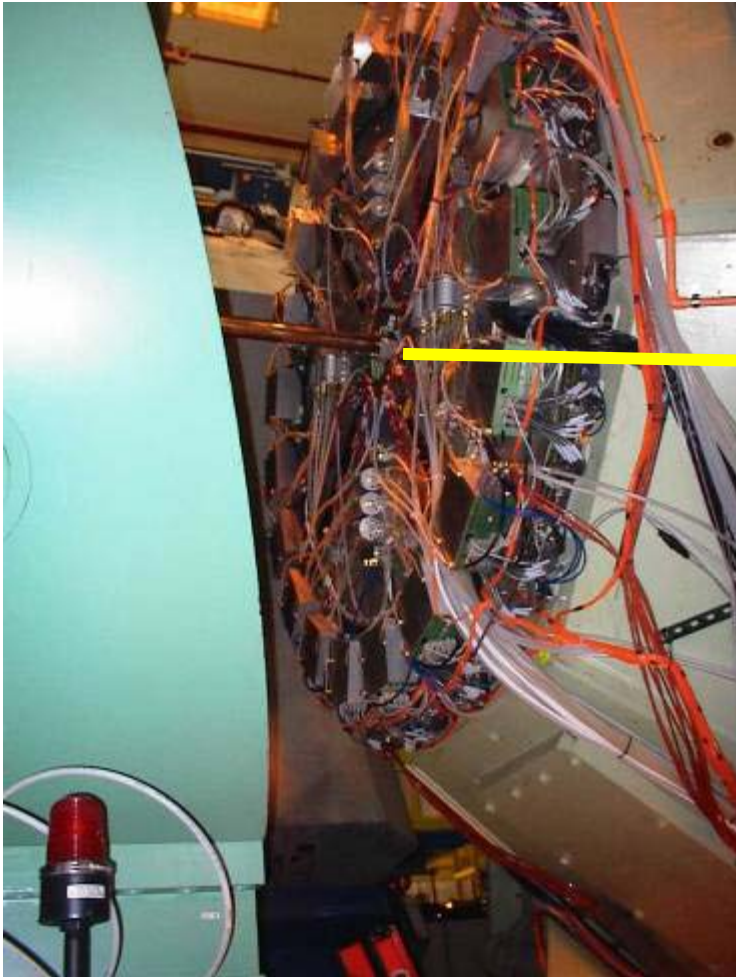


**MPC after all
modules are
installed, before
moving back in
cavity and
before being
cabled**

**(MuTr Station 1
omitted for
clarity)**

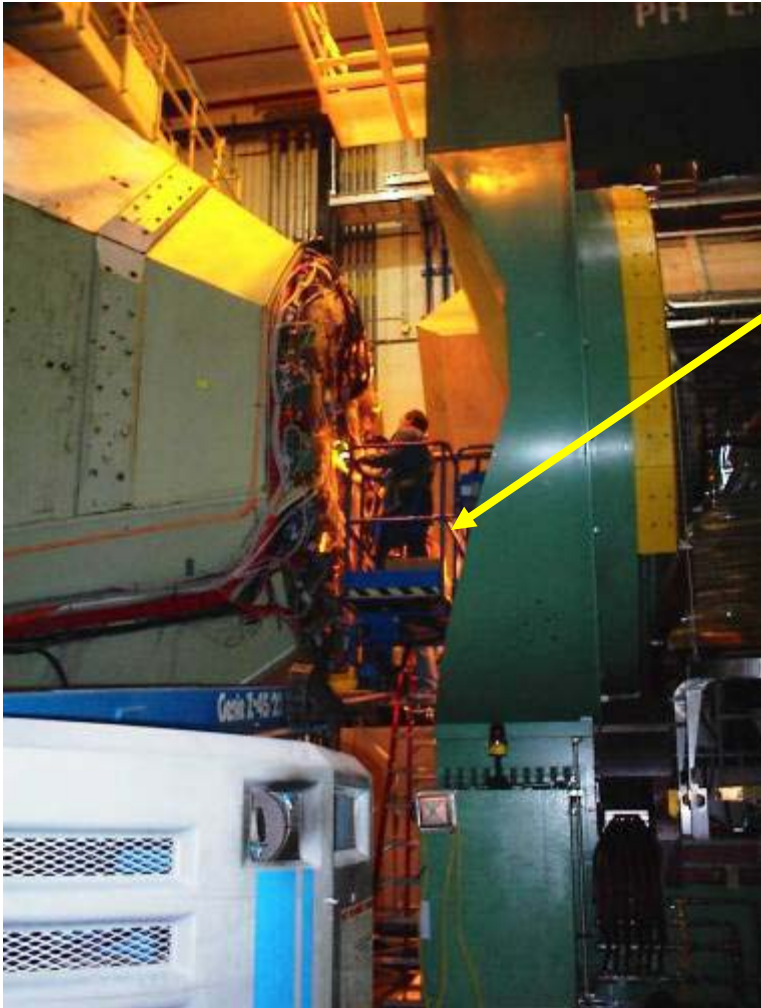
MPC North Installation Plan

MPC North will be installed in the Muon Magnet North piston cavity

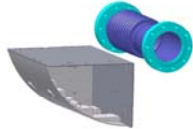


July 24, 2006

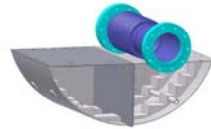
MPC North Assembly



**MPC North to be installed from
man lift, as South version was.**



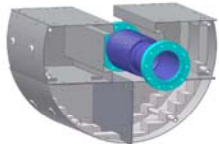
1



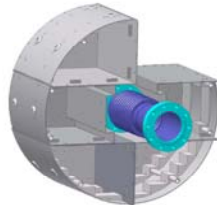
2



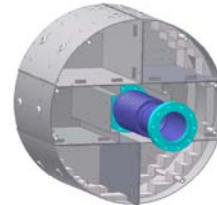
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4



5



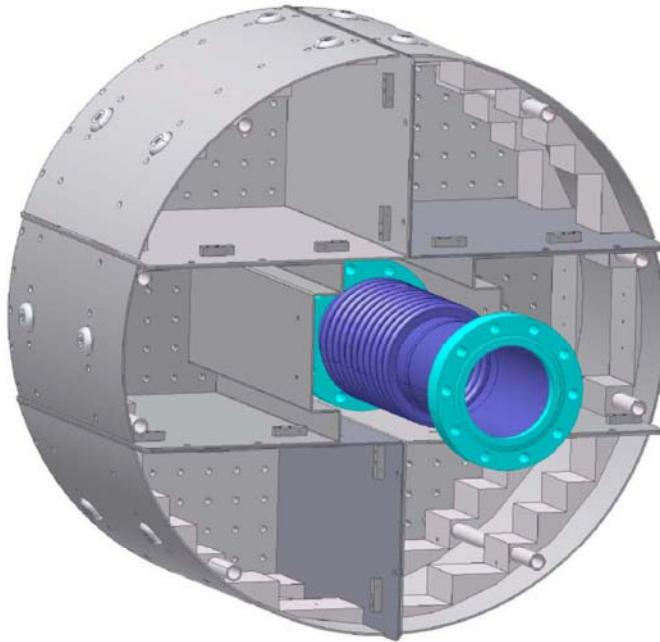
6

Empty sextants are installed first. LED's and LED board are already attached.

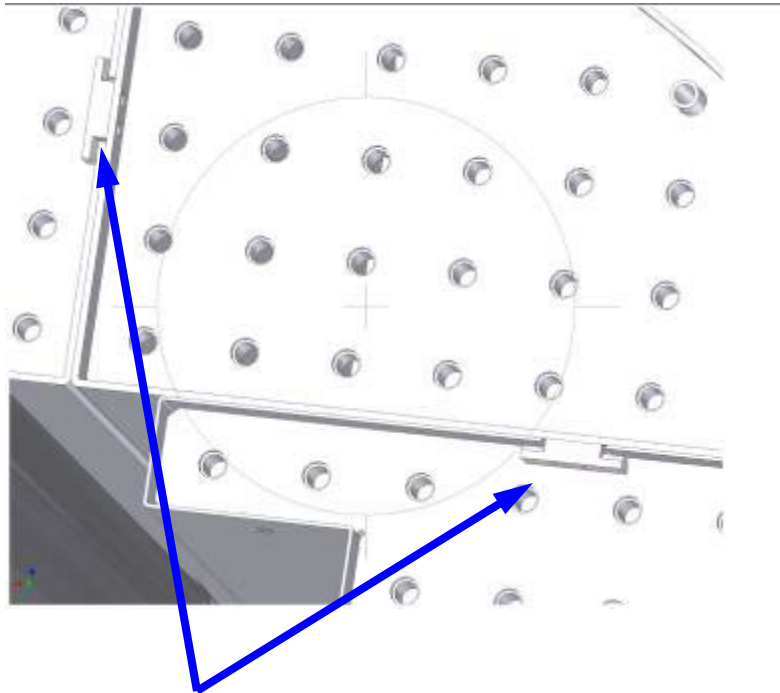
Then modules are individually inserted.

Next APD cable is attached then snaked through cover which is attached.

Finally, standoffs and signal pcbs are attached, wired and routed to MPC N rack.

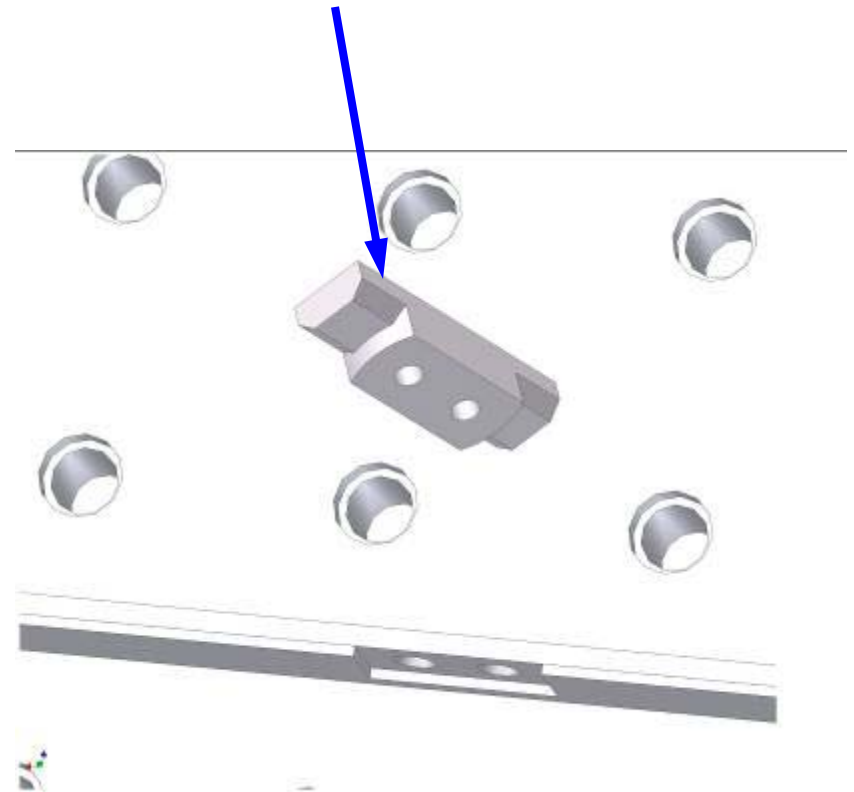


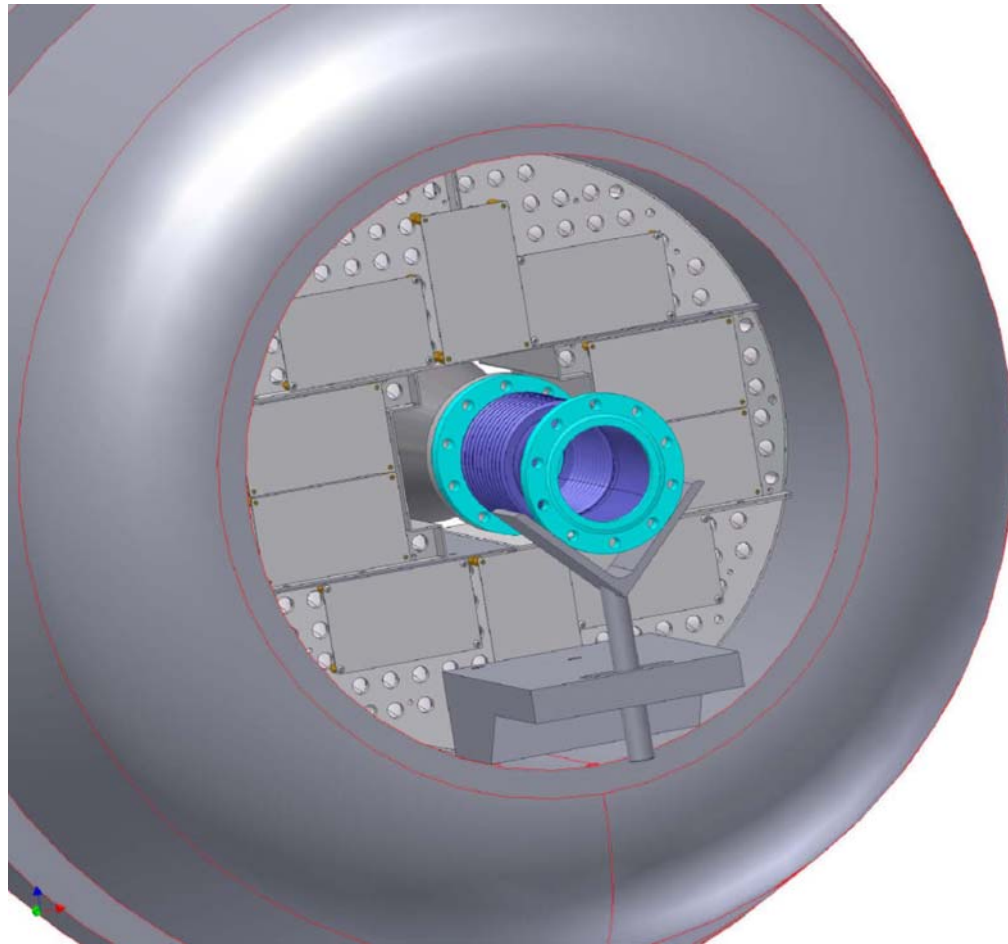
All of the
empty sectors
are installed
before the
crystals are
inserted



Modules interconnect at rear using tabs as in MPC S

Tabs for MPC N modified for increase clearance and rounded for easy locating and self centering





**MPC North mechanical
assembly complete
ready for cabling**

MPC North Cable Routing



Location for MPC N rack
(side of MuID rack)

Need to relocate this cable tray

MPC North Cable Routing

1



2



3



4



1. From MuID rack to NMM
2. Up NMM vertical I/shade
3. Over top of NMM to center, then down
4. Under scaffold platform
5. down top lampshade (like MPC S)

5



July 24, 2006

MPC North Assembly